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Modelling Forgetting at Different Timescales

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Abstract

Models of memory that rely on a single forgetting curve can struggle to simultaneously capture memory performance over short and long timescales. Typically, model parameters that account well for forgetting over a span of seconds or minutes are too pessimistic when it comes to predicting longer-term retention over days or weeks. Crucially, it is precisely the ability to model memory performance within and between study sessions that is valuable in applied educational settings. Previous attempts to address the underestimation of long-term retention involved scaling down between-session time. Here, we investigate how the optimal scaling factor changes as a function of the interval between study attempts, using a rich naturalistic dataset with intervals ranging from several seconds to multiple weeks. By fitting an ACT-R model, we show that the optimal scaling factor changes with time and interacts with the retrieval threshold. This finding has direct practical and theoretical implications.